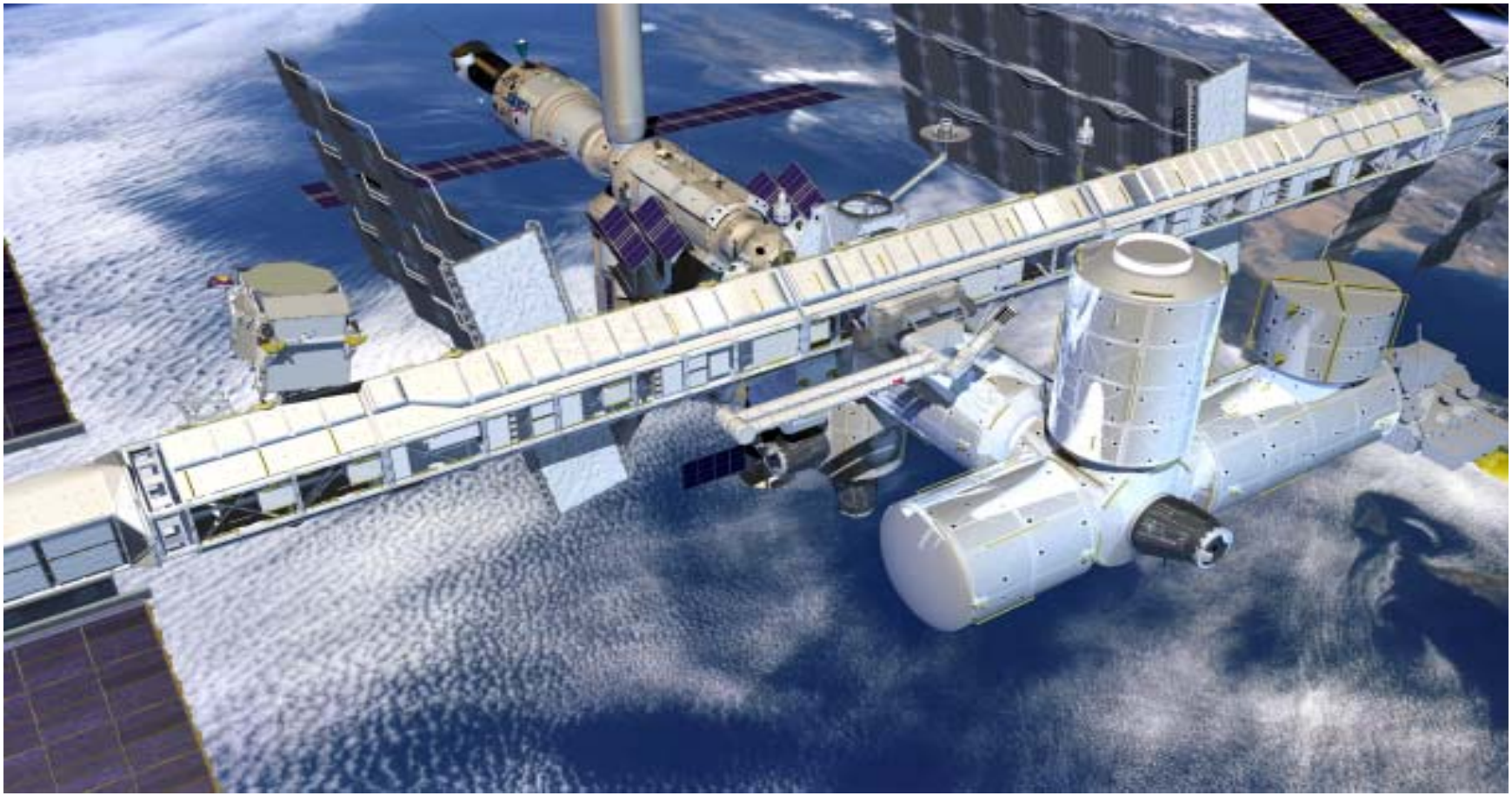
AMS PMC Review



Stephen V. Porter
AMS Project Manager
JSC / EA1

AMS PMC Review

History:

- AMS Project assigned new Project Manager 7 May 04
- FY05 Budget due to HQ on 13 May (4 working days after reassignment)

NASA Role for AMS

- Provide Payload Integration Hardware and flight interface software
- Provide process, facilitation, and analysis for Flight Safety
- Provide mentoring for Payload experiment providers
- Implied role for Mission Success

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AMS PMC Review

AMS Budget

- FY04 Budget set
  - Additional $600K promised (DOE) to accelerate Phase II Safety Review
  - Only $300K coming from DOE (maybe)
- FY05 Budget accepted by HQ PM on 13 May
- FY05 submit:
  - Lockheed budget submit with CS / On-site contractor support
  - 25% Project Management Reserve for Project Growth
  - HQ to carry reserve to the JSC Independent Cost Estimating Team ICE+50 Budget Estimates
  - Additional resources for CS
  - Some facility costs in HQ numbers (Cargo Integration Test Equipment/CITE & Non-Standard Services)
- Status: JSC submit accepted through the Code U process and approved as recommended by EA to Code U

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AMS Project Manager
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AMS PMC Review

AMS Budget

FY04	FY05	FY06	FY07	FY08	FY09	FY10	FY11	Total (FY05-11)
Project Funding Requirement								
5.113	6.140	6.420	5.300	1.800	0.600	0.510	0.910	21.680
JSC Support to AMS (Full Cost Acct. / FCA)								
0.396	0.937	0.983	1.028	1.342	1.111	1.143	1.177	7.721
Project Contingency*								
0.000	1.770	1.850	1.580	0.160	0.090	0.080	0.100	5.630
Subtotal (Project+FCA+Cont.)								
5.509	8.847	9.253	7.908	3.302	1.801	1.733	2.187	35.031
KSC Special Services								
	0.426	0.649	1.244					2.319

* Allowances for Project Work Growth, NOT new work.

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What we've done

- Delivered the FY05 Budget
- Completed a quick EA review of the AMS Project
- Created a WBS linked to schedule and resources
  - Began tracking to new WBS tasks to develop a cost history
  - Began "charging" to new WBS charge codes on 24 May
- Set up Project Schedule on Project 2001 to facilitate cost and schedule tracking
- Set up a quality records system on-line and hardcopy
  - Set up EA website for Project at http://www4.jsc.nasa.gov/eaprojects/eaprojects/flightgfe/ams_02/html/ams_02.htm
  - Plan to set up mirrored site on the AMS Collaboration Website (minus export sensitive Data at http://ams.cern.ch/AMS/ams_homepage.html
  - Provided for Quality Record / CM Project Support
  - Initiated planning for a quality system and product review

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What we've done

- Completed AMS Project Re-Baselining Review
  - Process to review Project Documentation, clean up processes, re-establish JSC AMS Team
  - Provided compliance with Work Instruction EA-023 (Project Management), & -027 (Configuration Management)
    - Reviewing compliance with new JPG 7120.3 Project Management
- Delivered the Message to the Collaboration
  - Forget flight slips: Deliver the Payload for a KSC Launch ready date of Sept. '07
  - Support with flight hardware / software schedules & payload assembly / integration plan
- Through the PTRS & PMP, re-defined NASA role for AMS
  - With an eye on the "Road to CoFR," this is based on
    - Verify ALL requirements for NASA provided hardware / software
    - "trust-but-verify" for all Collaboration Safety Critical Requirements
    - "insight but not oversight" of Collaboration Mission Success Requirements

    } **MVP**
  - Major philosophical change:

    NASA will see that all the problems are fixed, but will no longer be Mr. Fix-it

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What we've done

- Set up regular AMS Configuration Control Board (CCB) with full time Collaboration Support
  - Collaboration agreed to schedule, risk, and process review at CCB
- Met with ETH / Prof. Hofer to discuss Key Flight hardware Schedule, weld technical and quality issues
  - Helium dewar weld quality manager hired on-site
  - ETH contracted with LMCO to provide weld quality expert to help set up weld quality system
- "Keystone" Collaboration Flight hardware schedules and integrated Assembly Plan in work
- Established an IRMA based risk system (web-based) with Collaboration participation
  - Team training in work
- Re-set signature process for SSP and ISS ICD's
- Re-scheduled Phase II Safety Review
  - Postponed due to $600K shortfall in promised funding for HQ, Weld quality process, Re-Baselining
- Reviewed Project requirements in view of other ISS / SSP Program cutbacks (CITE, non-standard services, etc.)
- Re-established NA support

What's Next ?

- Continue Project Business review
  - Periodic review of integrated cost & schedule linked to WBS
  - Monitor estimated cost –vs- tasking
- Complete Re-Baselining Review, update documentation, and get them signed
- Complete update of ICD's and get them signed
- Re-Inforce "insight role" with Team
- Document full road to CoFR
  - Re-look at verification / acceptance plan
  - Re-look and facility requirements and costs (JSC & KSC)
  - Re-look at Mission Success plan

  } **MVP**
- Verification and Quality review for Collaboration Safety Critical requirements
  - Process to 'buy' design and safety requirements at hardware/software providers

Stephen V. Porter
AMS Project Manager
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Current Status of AMS-02 PIH Development and Fabrication

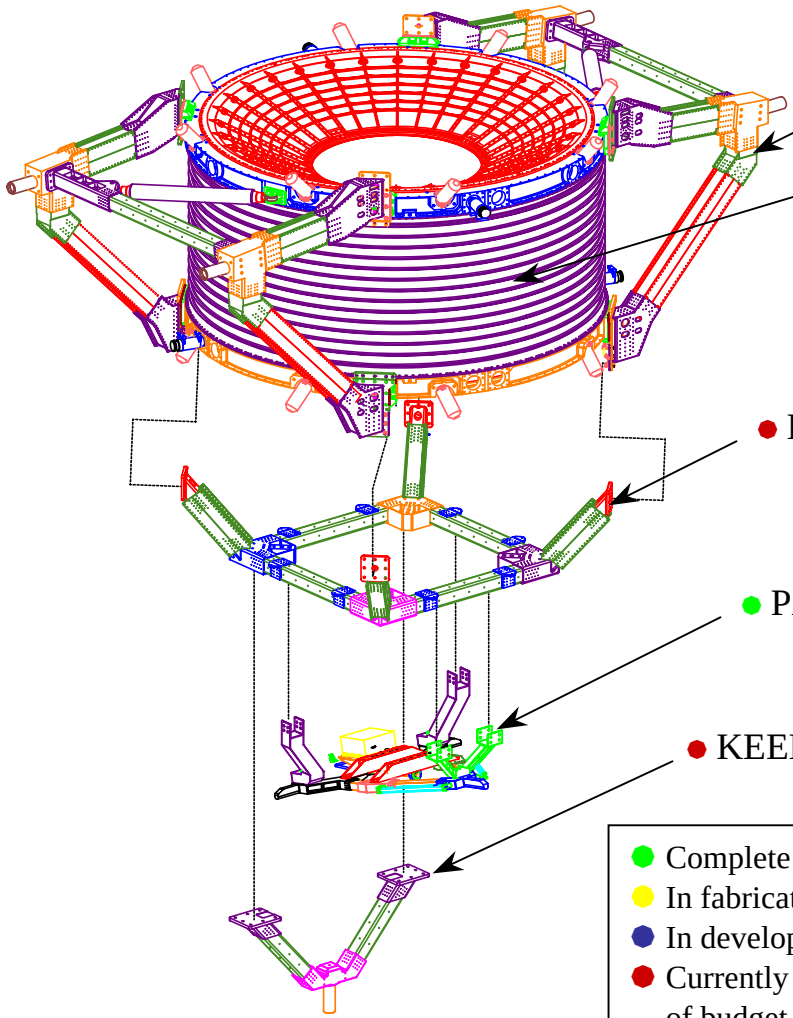
Other NASA Payload Integration Hardware includes:

Flight

- Umbilical Mechanism Assembly
- External Berthing Camera System
- Power Video Grapple Fixture
- Flight Releasable Grapple Fixture
- Handrails & Worksite Interface
- Remotely Operated Electrical Umbilical
- EVA Connector Panel
- Digital Data Recording System-02
- Micrometeoroid & Orbital Debris Shielding
- Interface Brackets

Non-Flight

- Multi-Purpose Lift Fixture x 2
- Primary Lift Fixture
- Primary Support Stand
- Vacuum Case Test Fixture
- O-ring Test Fixture
- NBL Mockup
- Intermediate Support Fixture x 4
- Assembly Fixture
- PAS Test Fixture
- Misc. Test Fixtures
- Static and Modal Test Fixtures
- Acoustic Test Fixture



- Complete
- In fabrication at Subcontractor
- In development & on schedule
- Currently stalled pending resolution of budget issues – AF manufacturing work has begun with savings from '04

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AMS Project Manager
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NASA Flight Hardware State of Readiness

Component	State of Readiness	Weight (lbs)*	Schedule Issues
USS-02	In Manufacturing	1610	Lack of funding in ’04 has pushed manufacturing into ’05 and ‘06
USS-02 Assembly Fixture	Ready to Manufacture	Non-flight	Using savings from ’04 to begin this work in June ‘04
Primary Support Stand	Ready to Manufacture	Non-flight	Lack of funding in ’04 has pushed manufacturing into ’05 and ‘06
Vacuum Case Test Fixture	Nearly Ready to Manufacture	Non-flight	Lack of funding in ’04 has pushed manufacturing into ’05 and ’06. Some analysis can not be completed due to lack of funding in ’04. This could effect schedule if design work-arounds can not be found.
ISS/STS Integration Hardware Components (mainly interface brackets)	In Design	40	Lack of funding in ’04 has pushed manufacturing into ’05 and ‘06
Static, Modal, & Misc. Test Hardware	In Design	Non-flight	Lack of funding in ’04 has pushed manufacturing into ’05 and ’06

* Total Payload Contingency weight is 213 lbs

Stephen V. Porter
AMS Project Manager
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NASA Flight Hardware State of Readiness

Component	State of Readiness	Weight (lbs)*	Schedule Issues
Vacuum Case	In Manufacturing	1587	On Schedule
Grapple Fixtures	Complete	131	Ahead of Schedule
Remotely Operated Electrical Umbilical – Payload Disconnect Assembly	In Assembly	36	Ahead of Schedule
Passive Payload Attach System & Umbilical Mechanism Assembly	Complete	224	Ahead of Schedule
EVA Connector Panel	In Design	55	On Schedule
EVA Handrails and Portable Foot Restraint Socket	Ready to Manufacture	16	On Schedule
External Berthing Camera System	In Manufacturing	25	On Schedule

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AMS Project Manager
JSC / EA1

NASA Flight Hardware State of Readiness

Component	State of Readiness	Weight (lbs)*	Schedule Issues
Micrometeoroid & Orbital Debris Shielding	In Design	102	On Schedule
Multi-purpose Lift Fixture x 2	Complete	Non-flight	Ahead of Schedule
Passive Payload Attach System Test Hardware & Other Misc. Test Hardware	Complete	Non-flight	Ahead of Schedule
Intermediate Support Fixtures	Complete	Non-flight	Ahead of Schedule
Lower USS Shipping Fixture	Complete	Non-flight	Ahead of Schedule
O-ring Test Fixture	Complete	Non-flight	Ahead of Schedule
Primary Lifting Fixture	Complete	Non-flight	Ahead of Schedule

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AMS Project Manager
JSC / EA1

AMS Experiment Flight Hardware State of Readiness

Component	State of Readiness	Weight (lbs)*	Schedule Issues
Cryomagnet System		5196	
Magnet	In Assembly	-	On Schedule
Superfluid Helium Tank	In Manufacturing	-	Currently experiencing manufacturing technical problems that we are working to resolve – This is on the critical path and could affect launch readiness date
Cryosystem	In Design & Manufacturing	-	Valve and warm helium tank design is progressing slowly
TRD	In Assembly	981	On Schedule
TOF	In Assembly	525	Ahead of Schedule
Tracker	In Assembly	438	On Schedule
ACC	In Assembly	117	On Schedule
RICH	In Manufacturing	406	On Schedule
ECAL	In Testing	1407	Ahead of Schedule
TCS	CDR In March 04	686	TTCS is a technology challenge that could easily become schedule concern
Electronics	In Assembly	1014	On Schedule
ACOP	In Design	144 (Pressurized)	Issue of who is designing

AMS-02 Risk Assessment

- HQ reorganization will disturb budget agreements
- HQ cash flow for FY04 still has not delivered all FYO4 $$$
  - HQ sent $3.4M of the FY04 approved budget of $5.1 M
- Welding on the He Dewar still not a quality process
- Launch Date Uncertainty
  - Launch date has slipped numerous (12) times over the past five years (on AMS-01, we had 2 launch slips)
- ISS Integration because we are the pathfinder attached payload
- Personnel turnover & continuing education program for less experienced personnel is costly and difficult to predict
- LMSO SEAT contract ends on December 31, 2004 – Estimated escalation rates were assumed in this estimate but could be wrong
- Experiment uncertainties
  - TTCS includes a two phase CO2 active cooling system that has never been used on an active payload in space
  - Plumbing and cable routing is completely undefined and must be routed all over the USS-02 and VC

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AMS Project Manager
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AMS-02 Risk Assessment

- Cryomagnet uncertainties
  - SFHe Tank Manufacturing is extremely difficult task that must be certified safe for flight – this is the largest SFHe tank ever flown to space
  - Non-linear support straps are significant technological leap that require extensive research and development in order to certify for flight
  - Non-linear coupled loads analysis with STS has been much more complex and time consuming than originally planned
  - Burst disc certification for flight
  - Hardware design / procurement immature and fraught with funding issues

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AMS Project Manager
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Programmatics

- Met with Prof. S. Ting and Adm. Stiedle (Staff) 14 June re: Using superconducting magnet for radiation protection on Human Planetary missions
  - AMS required to characterize the radiation environment
  - Magnetic a very good potential for 'shield' as physical / material protection non-deteriministic
  - Potential for Code T Funding for core-winding material development

- " Interagency Working Group on the Physics of the Universe, which is chartered by the **National Science and Technology Council** (NSTC), recently released a report, ' A 21st Century Frontier of Discovery: the Physics of the Universe.' This report, which was prepared in response to a **2002 NRC report** ('Connecting Quarks with the Cosmos: Eleven Science Questions for the New Century'), ***lists the Alpha Magnetic Spectrometer (AMS) as one of the current projects that could address the NRC Report question # 6 : "How do Cosmic Accelerators Work and What are they Accelerating? "***

Stephen V. Porter
AMS Project Manager
JSC / EA1

AMS Project Message

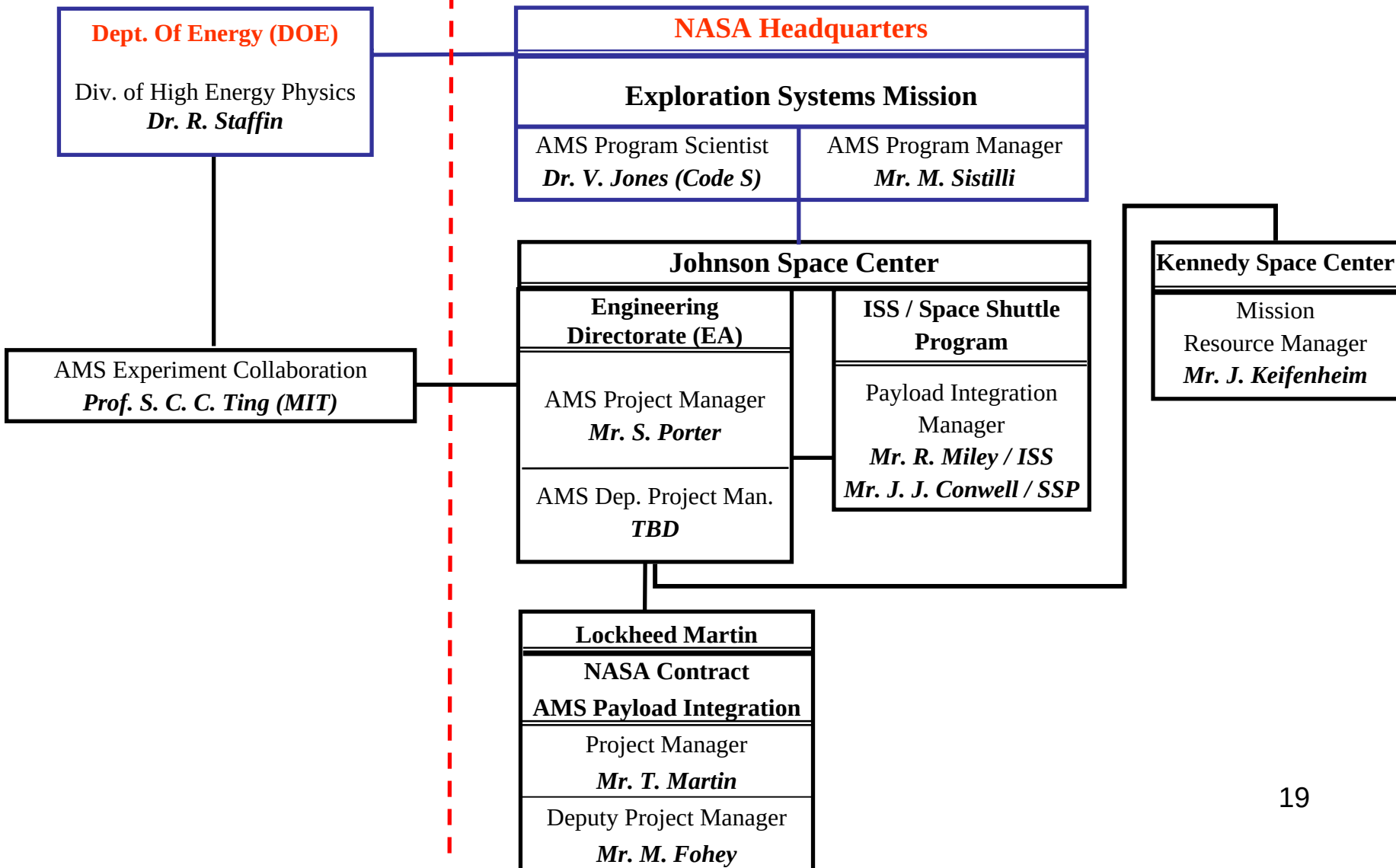
- **EA has Stepped-up to the AMS Project Management Challenge**
- **AMS Project Team has completed a Re-Baselining effort and is now compliant with JSC Project Management Requirements**
  - **<u>EXCELLENT</u> LMCO SEAT EFFORT**
- **WBS-Based Cost control, work control, and management control is in place**
- **Project CCB, with full JSC Directorate, Collaboration, and Contractor Participation, is in place**
- **AMS Team "Road-to-CoFR" Plan has a good start (Master Verification Plan for NASA hardware/software verification, flight-safety verification, and insight into Mission Success)**
- **AMS Project Risk is being evaluated and mitigated in a disciplined manner**
- **The Collaboration is supporting the new Project Office**
  - **Signed up to deliver hardware for KSC Flight Ready Delivery in Sept. '07**
  - **Began Integrated Flight hardware Assembly Plan and Keystone Schedules**
  - **Addressing Quality and Management issue**

Stephen V. Porter
AMS Project Manager
JSC / EA1

AMS PMC Review

BACK - UP

AMS Project Functional Organization Chart



AMS POP '04 BOE: OPTION 3 – JAN. 2008 LAUNCH READY*

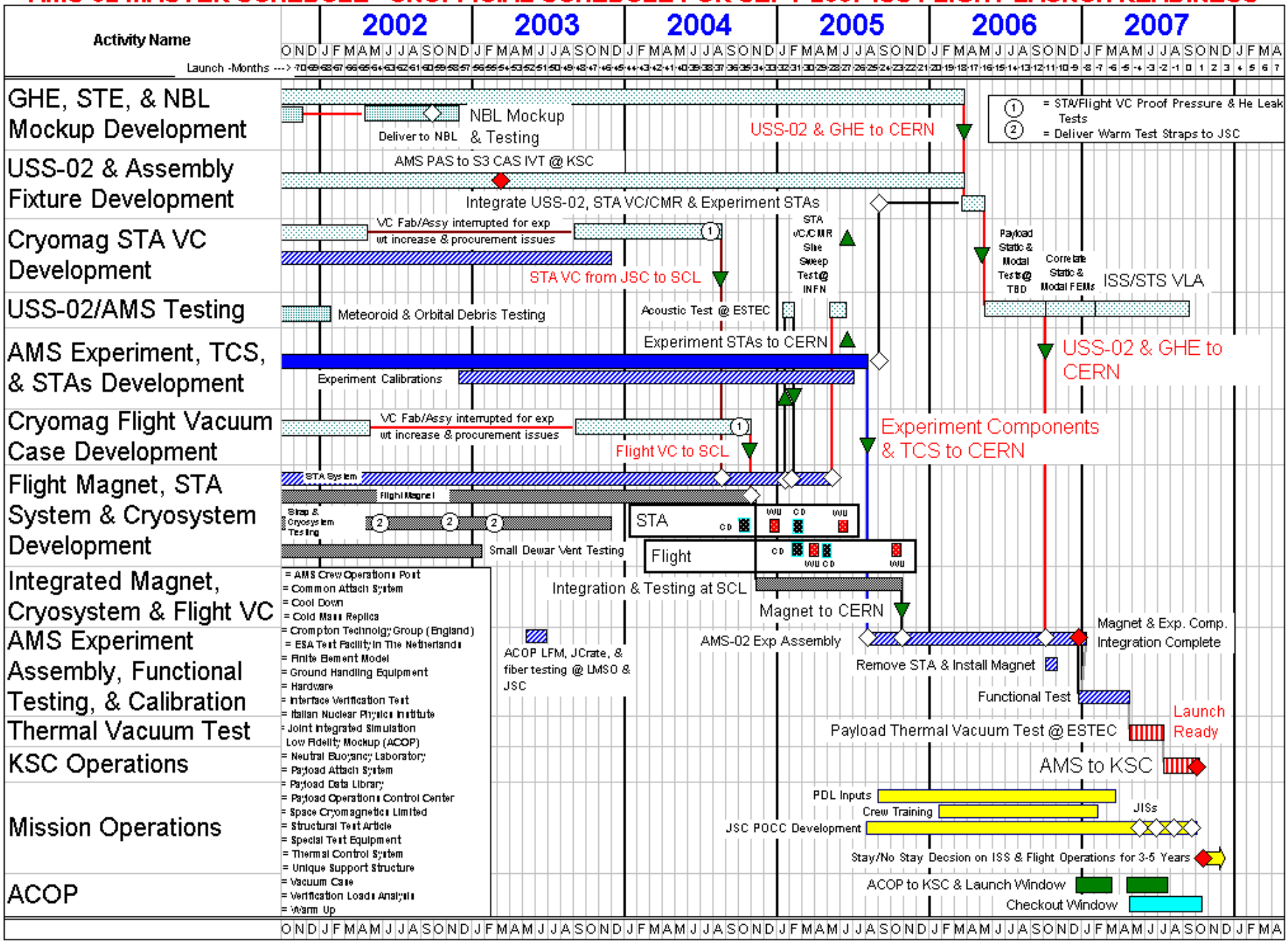
BOE: OPTION 3 - JANUARY 2008 LAUNCH READY*
Task Title: AMS
UPN: 959-70-AA

	FY04	FY05	FY06	FY07	FY08	FY09	FY10	FY11	Total (FY05-FY11)
PROCUREMENT									
Fund Guidelines (Baseline)	5.113	2.890	2.096	0.926	0.571	0.606	0.606	0.000	7.695
DOE Related/Mentoring	-	1.810	2.010	1.810	-	-	-	-	5.630
USS & GHE Manufacturing	-	1.440	1.850	-	-	-	-	-	3.290
VC Manufacturing	2.200	0.700	-	-	-	-	-	-	0.700
PIH Development, Integration, Certification, & Operations	2.413	1.440	2.014	2.841	1.344	0.389	0.419	0.728	9.175
Management/Safety	0.500	0.750	0.546	0.649	0.456	0.211	0.091	0.182	2.885
Project Funding Requirement	5.113	6.140	6.420	5.300	1.800	0.600	0.510	0.910	21.680
PROCUREMENT DELTA	0.000	3.250	4.324	4.374	1.229	-0.006	-0.096	0.910	13.985
JSC SUPPORT TO AMS (Notes 1& 2)									
Fund Guidelines (Baseline)	0.534	0.564	0.589	0.614	0.654	0.656	0.658	0.660	4.395
JSC Support to AMS	0.396	0.937	0.983	1.028	1.342	1.111	1.143	1.177	7.721
JSC SUPPORT TO AMS DELTA	-0.138	0.373	0.394	0.414	0.688	0.455	0.485	0.517	3.326
Subtotal (Project+FCA)	5.509	7.077	7.403	6.328	3.142	1.711	1.653	2.087	29.401
CONTINGENCY									
Project Contingency*	0.000	1.770	1.850	1.580	0.160	0.090	0.080	0.100	5.630
Subtotal (Project+FCA+Cont.)	5.509	8.847	9.253	7.908	3.302	1.801	1.733	2.187	35.031
APA									
Allowance for Program Adjustment (APA)*	0.000	1.260	2.540	2.870	0.430	-0.150	-0.060	-0.200	6.690
Grand Total (Project+FCA+Cont.+APA) & Recommended Funding	**5.509**	**10.107**	**11.793**	**10.778**	**3.732**	**1.651**	**1.673**	**1.987**	**41.721**
Fund Delta to Baseline	**-0.138**	**6.653**	**9.108**	**9.238**	**2.507**	**0.389**	**0.409**	**1.327**	**29.631**

Items listed below are included in the cost shown above.

Contractor WYE's Requirement	**18.1**	**24.1**	**24.6**	**28.6**	**13.2**	**5.3**	**4.5**	**6.6**
Off-site (reference only)	16.1	23.1	23.6	27.6	10.2	3.3	2.5	4.6
On-site*	2.0	1.0	1.0	1.0	3.0	2.0	2.0	2.0
Civil Service FTE's Requirement (Note 1)	**2.0**	**5.0**	**5.0**	**5.0**	**6.0**	**5.0**	**5.0**	**5.0**

AMS-02 MASTER SCHEDULE - UNOFFICIAL SCHEDULE FOR SEPT 2007 ISS FLIGHT LAUNCH READINESS

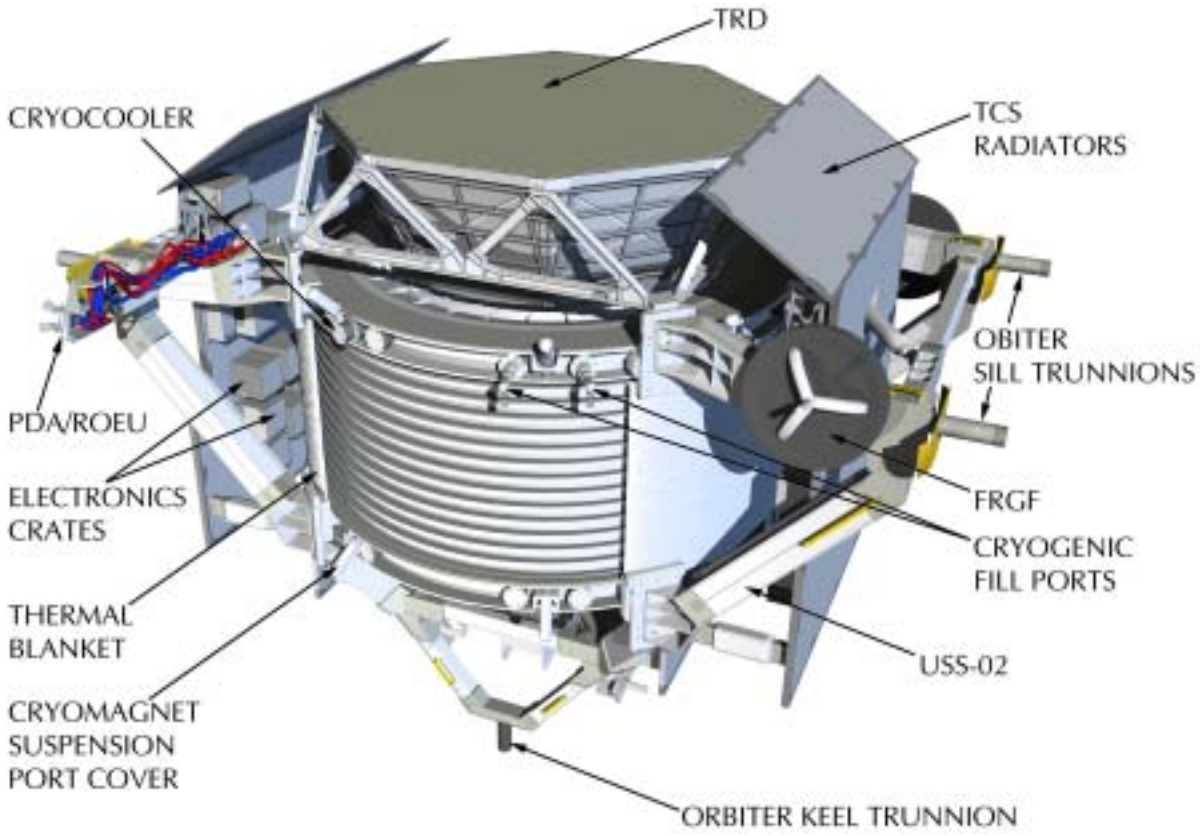


Jim Bates / Trent Martin (281) 483-0657 / (281) 333-6114

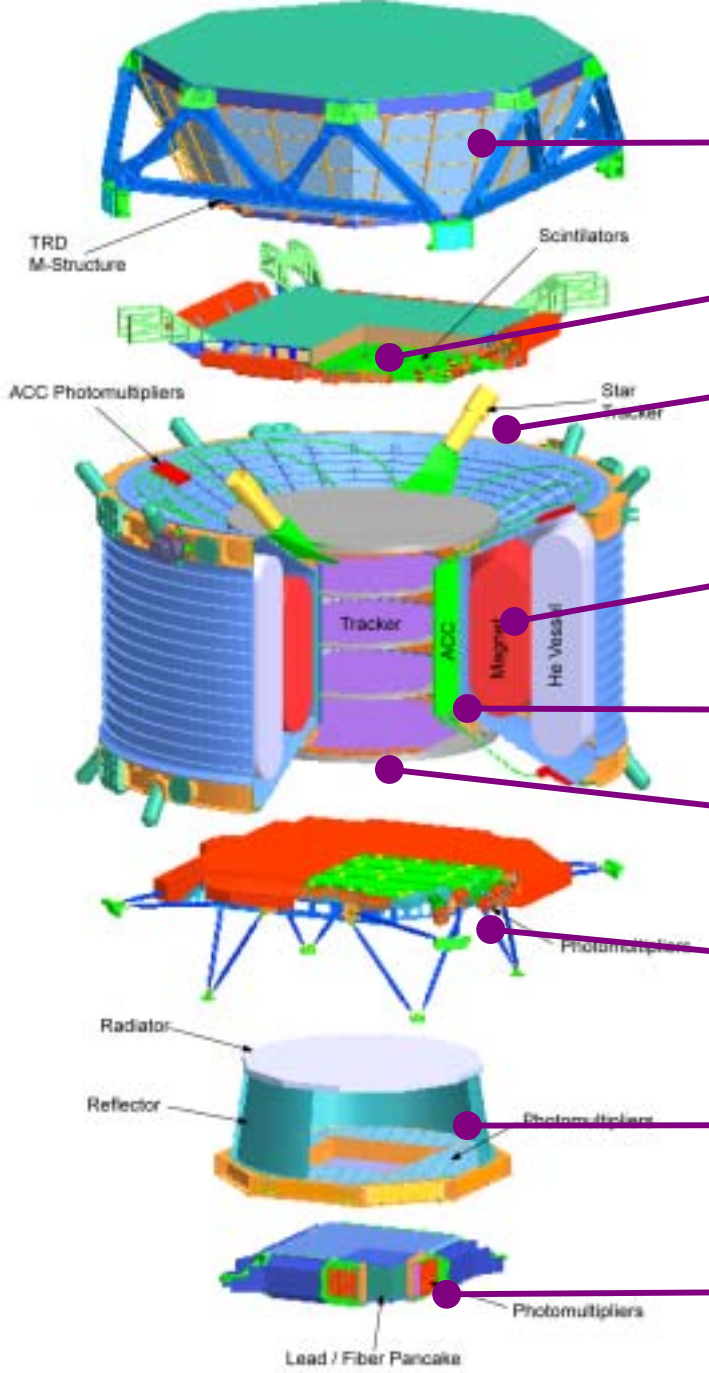
April 7, 2004

Rev. 23d

AMS PMC Review



AMS PMC Review



TRD — In Assembly

Upper TOF — In Manufacturing & Assembly

GPS & Star Tracker — In Design

Cryomagnet — In Design, Manufacturing & Assembly

ACC — In Prototyping & Manufacturing

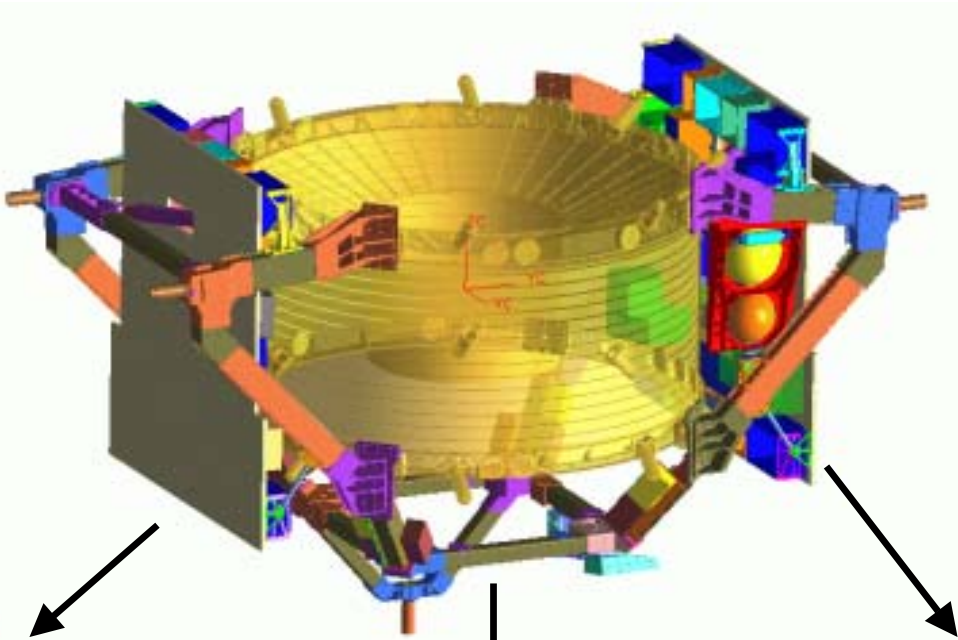
Tracker — In Assembly

Lower TOF — In Assembly

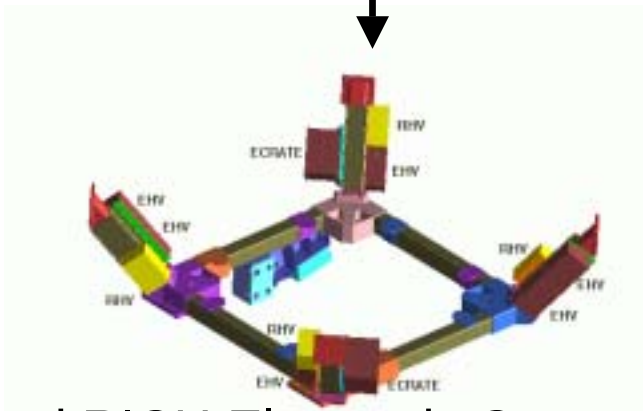
RICH — In Manufacturing & Assembly

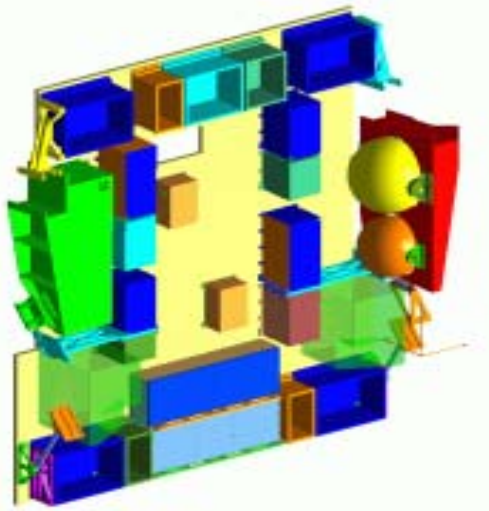
ECAL — In Testing

Ram Radiator and Electronic Crates



Wake Radiator and Electronic Crates





ECAL and RICH Electronic Crates

In Assembly & Testing

Stephen V. Porter
AMS Project Manager
JSC / EA1

AMS-02 Risk Assessment

Integrated Risk Management Application (IRMA) Home List

Status as of June 23, 2004

Org	Type	Number	Status	Title	Org. Date	Last Mod.	L x C
LMSO	Concern	1112	OPEN	Shuttles Have Not Returned to Flight		6/23/2004	4 x 3
LMSO	Concern	1114	OPEN	SFHe Tank Manufacturing		6/23/2004	4 x 4
LMSO	Concern	1115	OPEN	Non-Linear Support Straps		6/23/2004	4 x 0
LMSO	Concern	1116	OPEN	Non-Linear Coupled Loads Analysis		6/23/2004	4 x 4
LMSO	Concern	1117	OPEN	Burst Disc Certification		6/23/2004	3 x 3
LMSO	Concern	1118	OPEN	Vent Lines and Port Development		6/23/2004	3 x 4
LMSO	Concern	1119	OPEN	Warm Helium Tanks and Warm Valves		6/23/2004	3 x 3

Stephen V. Porter
AMS Project Manager
JSC / EA1

AMS-02 Risk Assessment

Integrated Risk Management Application (IRMA) Home List

Status as of June 23, 2004

Org	Type	Number	Status	Title	Org. Date	Last Mod.	L x C
LMSO	Concern	1120	OPEN	Cold Valves and Cryogenic Plumbing Design		6/23/2004	3 x 4
LMSO	Concern	1121	OPEN	Cabling Design (Internal and External)		6/23/2004	3 x 3
LMSO	Concern	1122	OPEN	Magnetic Field Compatibility Issues		6/23/2004	3 x 4
LMSO	Concern	1123	OPEN	ISS Integration Thermal Requirements		6/23/2004	3 x 3
LMSO	Concern	1124	OPEN	ISS Integration Costs		6/23/2004	3 x 2
LMSO	Concern	1127	OPEN	Venting Issue		6/23/2004	2 x 4
LMSO	Concern	1128	OPEN	TRD Gas Supply System		6/23/2004	3 x 4

Stephen V. Porter
AMS Project Manager
JSC / EA1

AMS-02 Risk Assessment

Integrated Risk Management Application (IRMA) Home List

Status as of June 23, 2004

Org	Type	Number	Status	Title	Org. Date	Last Mod.	L x C
LMSO	Concern	1129	OPEN	Zenith Radiator		6/23/2004	2 x 4
LMSO	Concern	1130	OPEN	Thermal Control System		6/22/2004	3 x 4
LMSO	Concern	1131	OPEN	TTCS Includes a Two Phase CO2 Active Cooling System		6/22/2004	4 x 4
LMSO	Concern	1132	OPEN	Plumbing and Cable Routing		6/22/2004	4 x 3
LMSO	Concern	1133	OPEN	LMSO SEAT Contract Ends on September 30, 2004		6/23/2004	4 x 4
LMSO	Concern	1134	OPEN	Continuous Unplanned Reviews		6/22/2004	4 x 2

Stephen V. Porter
AMS Project Manager
JSC / EA1